Exploring Bartlett Cove

If you just have a few hours...

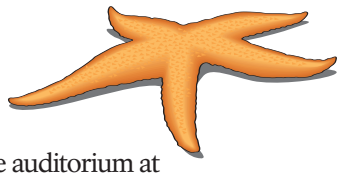
Visit the National Park Service Visitor Center: On the second floor of the Glacier Bay Lodge, you will find the NPS Information Desk and a variety of exhibits that explore the wonders of Glacier Bay. The Information Desk is open daily. During that time books and educational materials from the Alaska Natural History Association are available for purchase.

Catch a Film: The National Park Service shows several different films daily in the Auditorium.

2 p.m. Treasures of the Great Land:
Alaska's National Parks (22 min.)
5 p.m. Glacier Bay: Forever Wild (18 min.)
7 p.m. Glacier Bay: Beneath the Reflections (28 min.)

Walk the Forest Loop Trail: Go on your own or with a ranger. Daily ranger-led walks meet in the lodge lobby and depart at 2:30 p.m. for this 1.5-hour walk. See trail details, page 28.

Go for a Beach Walk: See trail details, page 28.



Take in an Evening Program: Join a ranger in the auditorium at 9 p.m. for a presentation about the park.

If you have a half day...

Hike to the Bartlett River: See trail details, page 28.

If you have a full day...

Cruise the Bay: This all-day boat trip up to the glaciers should not be missed! See the lodge front desk for details and to purchase your ticket. Binoculars, extra film, and warm clothing are highly recommended.

Hike to Bartlett Lake: See trail details, page 28.

Go for a Paddle: There are several options for kayaking around Bartlett Cove. Take a guided kayak trip with Alaska Discovery (advanced reservations appreciated), or rent a kayak from Glacier Bay Sea Kayaks and paddle your own. Experience Glacier Bay up close. You never know what you might see!

Become a Junior Ranger: Kids can visit the ranger at the NPS Information Desk to pick up their free Junior Ranger Activity Book. See page 31 for details.

Get the Latest Schedule of Events

Please see the NPS Information Desk or the bulletin board in front of the Glacier Bay Lodge for updates, desk hours, and evening program topics.

Managing for Wilderness

The overwhelming majority of visitors to Glacier Bay come in boats —both large and small. Park managers define how many boats should be in the bay and how they should operate in a manner that protects the park resources, wilderness character, and visitor experience.

The park began to manage vessels in the late 1970s, when concerns arose that marine traffic might adversely affect endangered humpback whales that feed in the bay during the summer months.

In 2003, the National Park Service completed an environmental impact statement that looked at vessel numbers and potential impacts. Private citizens, scientists, business operators, state and local governments as well as other federal agencies took part in the process, which determined how vessels would be managed for the next 10 to 15 years in Glacier Bay National Park. A Record of Decision, signed in November 2003, documents the decision to modify vessel numbers and operating requirements. New regulations implementing these changes are currently being promulgated and are expected to be in place by this summer.

Some issues decided in the process include:

- Cruise ship, tour boat, and charter vessel operations will continue as in the past with specific quotas. The number of cruise ships permitted to enter the bay will stay at no more than two per day. The total number of ships allowed entry June through August could increase from 139 to 184. Such a decision, however, would only be made based on recommendations by a science advisory board comprised of experts in such areas as the marine environment, air quality, wilderness values, noise levels, and recreation.

- New regulations will reflect changes regarding vessel speeds and travel restrictions when significant numbers of humpback whales are in the bay.

- Private boaters should find the vessel permitting process much simpler with a larger allocation of permits available on short notice, and more flexibility with entering and exiting the park.

Management of national parks is an ongoing process. We encourage you to talk to a ranger or visit our website for more information on issues affecting Glacier Bay National Park and Preserve. Get involved. After all, this is your national park. **www.nps.gov/glba**

Glacier Bay as Homeland

Imagine that you can hold Glacier Bay in the palm of your hand. It is smooth and round, about the size of a large egg. It is heavy, precious. Slowly you begin to peel back its layers, its meanings. The first layer, world heritage site, comes off. Next, you peel away the layer for the biosphere reserve. You are now looking at the layer for the national park and preserve. Gently you peel that away. Naked and vulnerable, wilderness trembles in your palm. As you marvel at the beauty, the fragility, something catches your eye. You realize that by holding the land up to the light just so, you can see another image distinct yet intangible as the morning mists. This new image reveals the essence of life for a group of people, the Hoonah Tlingit.

To the Hoonah Tlingit, Glacier Bay is not only the place where they once lived, hunted, fished, collected eggs and berries. It is the center from which they gain their identity as people — their spiritual homeland.

The modern village of Hoonah is in Port Frederick on Icy Strait. Traditionally, four Hoonah Tlingit clans occupied territories in and around Glacier Bay. When Glacier Bay became a national monument in 1925, its borders encompassed much of the traditional Hoonah Tlingit homeland. New federal laws severely curtailed Native activities within the monument boundaries. So began a painful period of Hoonah Tlingit and National Park Service relations.

But time has brought some healing. In recent years, the National Park Service has maintained an open dialogue with the Hoonah Tlingit and has actively encouraged them to return to the park to carry out traditional activities that are compatible with current regulations, such as berry picking. The park has sponsored boat trips for Hoonah school children and elders to come into the bay so the youths may learn traditional ways of knowing in the very place that figures so prominently in their spiritual lives. Scientific studies are also underway to determine if it is possible to allow the Hoonah Tlingit to resume harvesting gull eggs, seals, and mountain goats within the park without adversely impacting populations.

You will find the Hoonah Tlingit presence in and around Bartlett Cove. The sea otter hunting canoe on display next to the Visitor Information Station was carved in the park in 1987 by a team of Native carvers. Look for two Tlingit trail markers carved into living spruce trees near Glacier Bay Lodge; one on the trail leading down to the dock from the lodge and the other along the Forest Loop Trail. Depicting an octopus and an eagle respectively, these carvings are modern renditions of markings originally used to show clan ownership over trade routes. Today, they serve as reminders of ancient ties to the land.

Ultimately, we will all carry within us slightly different versions of the essence that is Glacier Bay. We may guard it carefully. From time to time, we can take it out to hold in our palm, to admire and share with others. Carefully peeling back the layers of our experience, we will rediscover the wonders we found to be sacred. And if we hold it up to the light just right, it might reveal something more.

A visitor pauses during a walk along the Forest Loop Trail to admire the Tlingit trail marker that was carved into a living spruce tree.

Glacier-Making Weather

Glacier Bay has a maritime climate, heavily influenced by ocean currents. The result is mild winter temperatures and cool summer temperatures near sea level. Summer visitors can expect highs between 50°-to-60° F (10°-15° C). Winter temperatures rarely drop into the single digits, with average nighttime lows in the mid-20s and highs in the upper-30s.

Bartlett Cove receives about 70-75 inches of precipitation annually. You may find yourself thinking it's all coming down during your visit. April, May, and June are usually the driest months of the year, while September and October tend to be the wettest. All this moisture helps to create the lush temperate rain forests of the lower bay.

Keep in mind, these are weather conditions at sea level. Up in the mountains, conditions are more severe with colder temperatures and more precipitation that takes the form of snow. It's all that snow falling year after year that goes into creating the magnificent glaciers we love to see.

What to Wear?

The weather in Glacier Bay can change quickly over the course of the day, especially if you are traveling into the bay. Dressing appropriately will enhance your trip by allowing you to stay out in the elements and make the most of wildlife and glacier viewing. Remember: it's usually cooler on the water and near glaciers.

Reduce, Reuse, Recycle

Inevitably, conducting business in this modern world requires using resources. Operating a national park is no different. Through creative planning and cooperative efforts, however, park managers are seeking ways to reduce the impacts that come with operations.

Park managers are working closely with the Gustavus Community Landfill to come up with a holistic waste management plan for the area to recycle, share resources, and avoid duplicating efforts.

To facilitate the process, park offices and housing areas are provided with separate receptacles for papers, plastics, metals, glass, compostables, and non-recyclables.

Receptacles for campers, boaters, and other park users are located near the Visitor Information Station. This initial separation helps make it possible for up to 65 percent of waste generated in day-to-day park operations to go on to another life.

Over 95 percent of the park's solid waste is sorted and shipped to Juneau for processing. Aluminum, paper products, steel, and #1 and #2 plastics go on to recycling centers. Locally, food waste from the park and the lodge, wood chips and brush from downed trees and clearing are composted into topsoil for the community. Composted sewage sludge is used as fertilizer. Any glass you throw away in the park will be pulverized into small non-sharp particles and used to stabilize roadbeds.

How can you help?

Please separate your waste into the appropriate bins near the Visitor Information Station.

Thank you!

Tides

The tidal fluctuations in Glacier Bay can be as high as 25 feet. This means that one moment you may be standing on the beach looking at mud flats stretching out for 100 yards and hours later the water is lapping at your toes. Or worse: one minute you've pulled your kayak up on shore so you can enjoy lunch, but you wake up 30 minutes later from your post-lunch nap to see your kayak floating away.

Tides result from the gravitational pull between the sun and the moon, and their relationship to the earth. As these three celestial bodies are constantly in motion, the amount of gravitational pull varies and the tide levels change. Because it's closer, the moon has the strongest influence on the tides. Its gravitational attraction causes the water surrounding the earth to bulge. It bulges on the side closest to the moon due to gravitational pull. The bulge on the opposite side of the earth is due to centrifugal force.

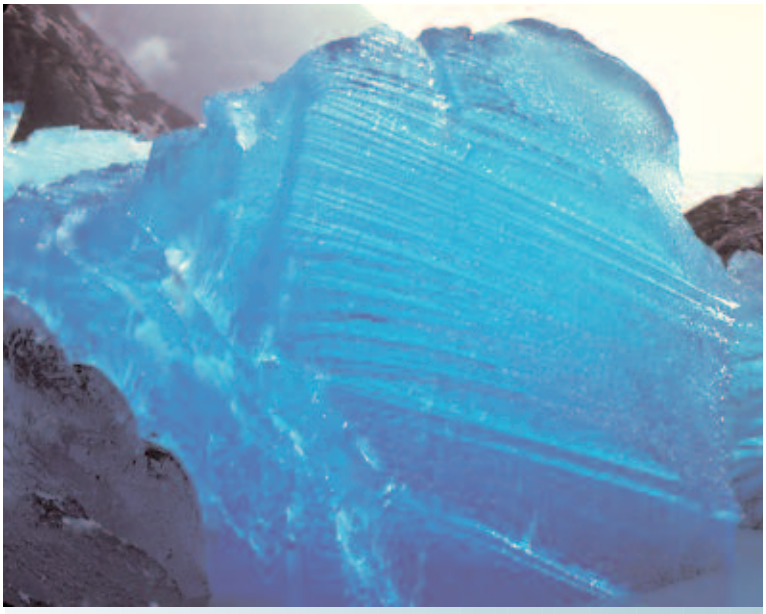
You hardly need to spend more than six hours in Bartlett Cove to realize that there is something interesting going on with the tides.

There are usually two high and two low tides daily on the West Coast. The times for highs and lows shift about 50 minutes later on consequent days. This means if high tide is at 9:00 a.m. one day, it will be high at about 9:50 a.m. the next day, around 10:40 a.m. the next, and so on. Local conditions, such as topography, also influence the tides and the currents they generate. The entrance to Glacier Bay is narrow, yet a great deal of water must rush through that opening twice daily, creating currents in Sitakaday Narrows as strong as seven knots.

To see this incredible force in action, walk down to the water's edge about an hour after high or low tide. Fix your gaze on a shell or a piece of seaweed and watch how its proximity to the water's edge changes in just minutes. Be sure to keep that in mind when you decide to enjoy an after-lunch nap on your next paddling adventure.

"The Master Builder chose for a tool, not the thunder and lightning to rend and split asunder, not the stormy torrent nor the eroding rain, but the tender snowflake, noiselessly falling through unnumbered generations."

— John Muir



Blue Ice, White Ice

If you've ever played with a prism in the sunlight, you know that natural light is made up of all the colors of the rainbow.

Each color of light has a specific wavelength and certain amount of energy. Colors such as red and yellow have long wavelengths and consequently low energy. But blue, with its short wavelengths, has high energy.

Glacier ice is made up of large, tightly packed ice crystals. When sunlight hits glacier ice, the ice acts like a prism and separates the light according to its wavelength. Low energy colors like red and yellow are absorbed by the ice. Blue has enough energy to reflect out to our eyes.

If the surface of the glacier ice becomes weathered or if the ice contains many air bubbles, the blue light becomes diffused. The ice appears white.

Rivers of Ice

A glacier is born high in the mountains, where the only precipitation that falls is snow, and the snow that falls does not melt. A slight depression on the mountainside catches this snow. Year after year, the snowflakes pile up. Soon the sheer weight of this vast accumulation presses down on itself. The snow compresses. The flakes change shape and fuse into ice. Eventually, the weight of the ice is too much for the depression to hold against gravity and the ice begins to flow downhill seeking equilibrium. Now that it's moving, it's a **glacier**.

Like a river, the glacier flows down the mountain choosing the path of least resistance. As it moves, it incorporates rocks into its lower layers. These acquired rocks grind away at the bedrock. In time, the glacial ice will carve deep valleys in the mountainside.

When the ice reaches lower, warmer elevations, it begins to melt. Eventually the loss through melting is greater than the supply of ice flowing down the mountain. The glacier ceases to make further progress, though the body of ice is still moving down the mountain. At this point, the glacier is like a one-way conveyor belt moving ice out of the mountains into the valleys.

Glaciologists have identified different types of glaciers based on their characteristics. For example, a glacier that remains confined within valley walls is a **valley glacier**. If it flows out of the valley and spreads out, it's a **piedmont glacier**. If it simply drops out of the valley, it's a **hanging glacier.** But the type of glacier most folks in Glacier Bay are interested in is the type that ends in the sea: the **tidewater glacier**.

Compared to glacial ice, seawater is warm and highly erosive. Waves and tides work away at the unstable glacier face, causing huge chunks to **calve** or break off into the ocean.

Barring significant climate changes, a glacier is in a constant state of renewal. New snow will continue to fall in the mountain basin to replace the snow that has compacted into ice and begun to flow downhill. The length of time it takes for a snowflake that falls in the mountains to emerge at the end, or **terminus**, of a glacier varies, depending on the speed at which the glacier is flowing. Scientists estimate ice you see at the face of the park's glaciers to be around 200 years old.

Glaciers: They are a-changin'

It has been said that you cannot step twice into the same river. In a sense, the same holds true for rivers of ice that we call "glaciers." A glacier is always growing, melting, moving, or calving somewhere. You don't need to linger long at the face of a tidewater glacier to get a sense of the drama. Calving occurs year-round. The glacier face you see today could change significantly by tomorrow, let alone 20 years from now.

Researchers are interested in these glacial dynamics and their causes. Scientists at the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) continue to conduct long-term glaciological research on present and past glacial activity in the region. Photographic surveys of the ice margins to document the long-term changes in the bay's glaciers began in 1927.

Changes in glaciers and ice fields could reveal changes in weather patterns and climates on a local, regional, and perhaps even global scale.

Dr. Dan Lawson of the CRREL provided the glacier dimensions below.

Glacier	*Height* Above and Below Waterline	*Width*	*Length*	*Flow Rate* (in feet)	*Status*
Grand Pacific	60-180 feet above 0-60 feet below	2 miles	35 miles	1-4 feet / day 350-1,200 feet / year	Receding/ Thinning
Johns Hopkins	250 feet above 200 feet below	1 mile	12 miles	10-15 feet / day 4,000 feet / year	Advancing/ Thickening
Lamplugh	150-180 feet above 10-40 feet below	.75 miles	16 miles	2-3 feet / day 1,200 feet / year	Stable to Receding
Margerie	250 feet above 50-100 feet below	1 mile	21 miles	6-8 feet / day 2,000 feet / year	Stable
McBride	200-250 feet above est. 300 feet below	.5 miles	13 miles	15-20 feet / day 5,000-7,000 feet / year*	Rapidly Receding
Muir	30 feet above 0 feet below	.5 miles	13 miles	.5 feet / day 150 feet / year*	Receding/ Thinning
Reid	>20-130 feet above 0-10 feet below	.75 miles	10 miles	1-3 feet / day 800 feet / year*	Receding/ Thinning
Riggs	20-90 feet above 0 feet below	.75 miles	15 miles	1-2 feet / day 600 feet / year*	Receding/ Thinning

*Estimated figures

A Brief Timeline of Glacier Bay

Prehistoric to present: Tlingit Indians and their ancestors had both permanent and seasonal settlements in much of what is now Glacier Bay National Park and Preserve. Several hundred years ago at the end of the Little Ice Age, advancing glaciers forced the Tlingit people to abandon their villages and move to Hoonah, across Icy Strait from Glacier Bay.

Today, many Hoonah Tlingits still regard Glacier Bay as their ancestral home, and feel a special connection to it. See page 5.

1877 Lieutenant C.E.S. Wood hired Tlingit guides to hunt mountain goats in the St. Elias Mountains. Convinced instead to hunt in Glacier Bay, he encountered Tlingit seal hunters encamped in several places. Wood was the first outsider to record a detailed account of native life, wildlife and scenery.

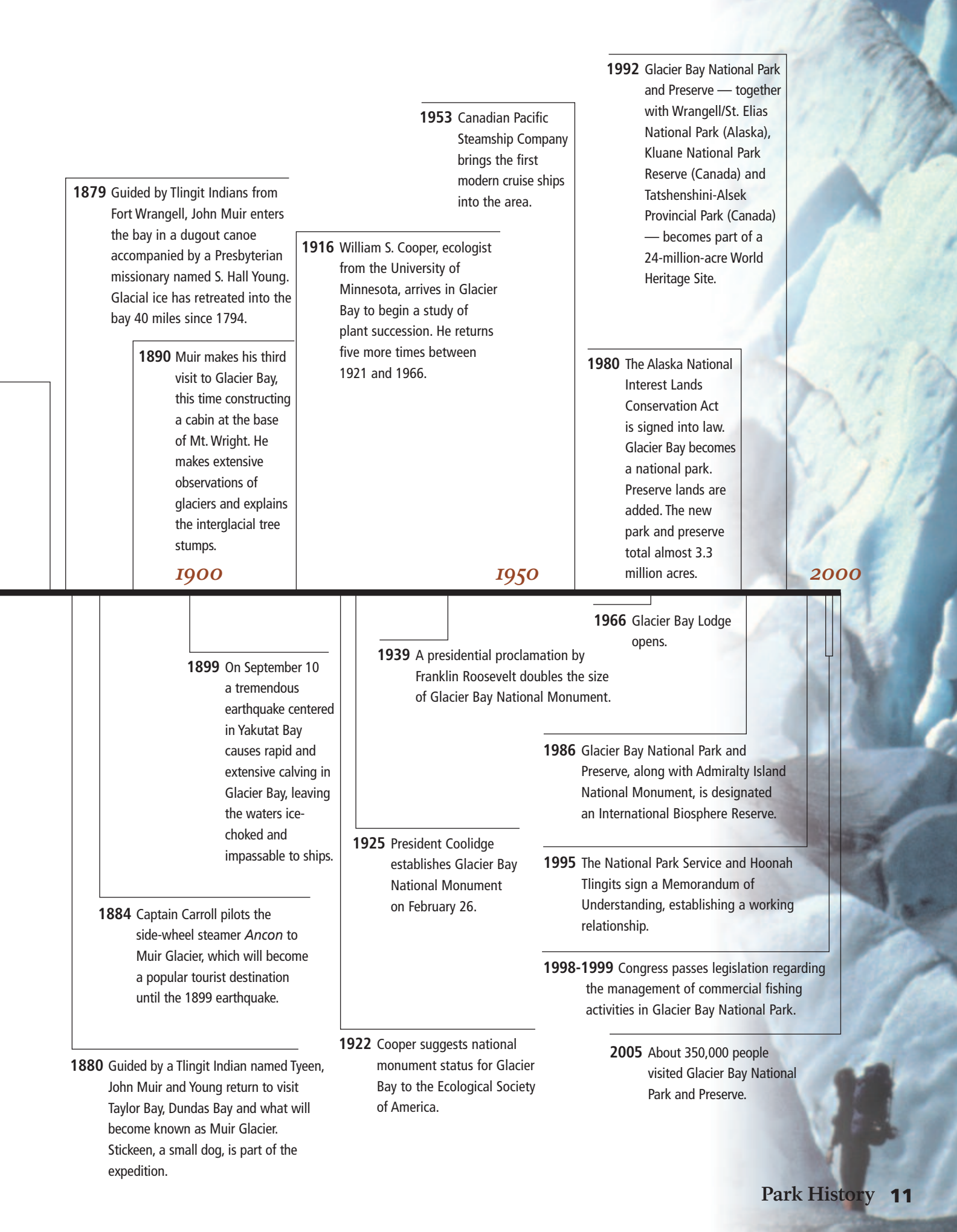
1778 Captain James Cook of the H.M.S. *Resolution* names Mt. Fairweather. His crew includes George Vancouver and William Bligh.

1750 1800 1850

1794 Captain George Vancouver of the H.M.S. *Discovery* and Lt. Joseph Whidbey describe Glacier Bay as "a compact sheet of ice as far as the eye could distinguish." The "bay" is a mere 5-mile indentation in the coastline.

1750 The Little Ice Age is ending and the glaciers begin to retreat.

1786 Captain Jean-Francois de Galaup de Lapérouse's party of the *Boussole* and *Astrolabe* while in Lituya Bay described the native peoples they met there, and the cartographers created the first detailed maps of park landforms. The expedition met tragedy on July 13 when 21 sailors were lost in the tidal bore at the mouth of Lituya Bay.



1992 Glacier Bay National Park and Preserve — together with Wrangell/St. Elias National Park (Alaska), Kluane National Park Reserve (Canada) and Tatshenshini-Alsek Provincial Park (Canada) — becomes part of a 24-million-acre World Heritage Site.

1953 Canadian Pacific Steamship Company brings the first modern cruise ships into the area.

1879 Guided by Tlingit Indians from Fort Wrangell, John Muir enters the bay in a dugout canoe accompanied by a Presbyterian missionary named S. Hall Young. Glacial ice has retreated into the bay 40 miles since 1794.

1916 William S. Cooper, ecologist from the University of Minnesota, arrives in Glacier Bay to begin a study of plant succession. He returns five more times between 1921 and 1966.

1890 Muir makes his third visit to Glacier Bay, this time constructing a cabin at the base of Mt. Wright. He makes extensive observations of glaciers and explains the interglacial tree stumps.

1980 The Alaska National Interest Lands Conservation Act is signed into law. Glacier Bay becomes a national park. Preserve lands are added. The new park and preserve total almost 3.3 million acres.

1900 *1950* *2000*

1966 Glacier Bay Lodge opens.

1939 A presidential proclamation by Franklin Roosevelt doubles the size of Glacier Bay National Monument.

1899 On September 10 a tremendous earthquake centered in Yakutat Bay causes rapid and extensive calving in Glacier Bay, leaving the waters ice-choked and impassable to ships.

1986 Glacier Bay National Park and Preserve, along with Admiralty Island National Monument, is designated an International Biosphere Reserve.

1925 President Coolidge establishes Glacier Bay National Monument on February 26.

1884 Captain Carroll pilots the side-wheel steamer *Ancon* to Muir Glacier, which will become a popular tourist destination until the 1899 earthquake.

1995 The National Park Service and Hoonah Tlingits sign a Memorandum of Understanding, establishing a working relationship.

1998-1999 Congress passes legislation regarding the management of commercial fishing activities in Glacier Bay National Park.

1922 Cooper suggests national monument status for Glacier Bay to the Ecological Society of America.

2005 About 350,000 people visited Glacier Bay National Park and Preserve.

1880 Guided by a Tlingit Indian named Tyeen, John Muir and Young return to visit Taylor Bay, Dundas Bay and what will become known as Muir Glacier. Stickeen, a small dog, is part of the expedition.